

The invention claimed is:

1. A convertible roof system comprising:
  - a front roof section;
  - a rear roof section;
  - a top stack mechanism coupled to the front and rear roof sections;
  - a primary automatic actuator coupled to the top stack mechanism,the primary actuator and the top stack mechanism serving to move the front and rear roof sections between retracted and raised positions; and
  - a supplemental automatic actuator coupled to at least one of: (a) the top stack mechanism, and (b) the roof sections, the supplemental actuator operably moving at least a portion of the roof sections toward each other after a majority of front and rear roof retraction has occurred in order to more closely store together the fully retracted front and rear roof sections.
2. The system of Claim 1 wherein the rear roof section is retracted to a substantially vertical position.
3. The system of Claim 2 wherein the front roof section is retracted to a substantially vertical position.

4. The system of Claim 1 wherein external surfaces of the front and rear roof sections are retracted to substantially parallel orientations facing substantially the same direction in an overlapping manner.

5. The system of Claim 1 wherein at least one of the roof sections defines a hard-top roof section.

6. The system of Claim 1 wherein one portion of the supplemental actuator is coupled to the top stack mechanism and another portion of the supplemental actuator is coupled to the rear roof section.

7. The system of Claim 1 further comprising a camming surface and a cam follower operably acting with the supplemental actuator to control the compacting movement between the roof sections during retraction.

8. The system of Claim 1 wherein the top stack mechanism includes at least two substantially parallel links pivotally coupling a stationary bracket to the rear roof, and the primary actuator is attached to one of the substantially parallel links.

9. The system of Claim 1 wherein the primary and supplemental actuators are fluid powered and have a linearly extendable piston rod.

10. A convertible roof system comprising:  
a first roof section;  
a second roof section; and  
a linkage mechanism operably moving the first roof section relative to the second roof section, the linkage mechanism including at least three primary links and a bellcrank, the primary links each having an end rotatable about a corresponding fixed pivot axis, at least two of the primary links operably moving the first roof section and at least the third primary link being coupled to the bell-crank, the bell-crank also being coupled to and causing movement of the second roof section.

11. The system of Claim 10 wherein the linkage mechanism includes at least one secondary link mechanism coupling at least one of the two primary links to the second roof section.

12. The system of Claim 11 wherein the bell-crank has a central pivot attached to the secondary link mechanism.

13. The system of Claim 10 further comprising an automatic actuator having a first portion movable with the first roof section and having a second portion movable with the linkage mechanism.

14. The system of Claim 10 wherein the first and second roof sections are hard-top roof sections.

15. The system of Claim 10 wherein the first and second roof sections are stowed in a substantially vertical direction.

16. The system of Claim 10 further comprising:  
a substantially rigid tonneau cover automatically moving from an open position to a closed position substantially covering at least a portion of the stowed roof sections; and  
an automatic actuator coupled to one of the primary links.

17. A method of operating a convertible roof system having a front roof section, a rear roof section, a primary actuator and a supplemental actuator, the method comprising:

(a) automatically retracting the roof sections from raised positions to mostly stowed positions through actuation of the primary actuator;  
and

(b) automatically moving a majority of at least one of the roof sections closer to the other of the roof sections through actuation of the supplemental actuator.

18. The method of Claim 17 further comprising nesting the roof sections adjacent each other in a substantially vertical orientation when stowed.

19. The method of Claim 17 further comprising stowing the roof sections with their raised outside surfaces in a rearwardly facing direction.

20. The method of Claim 17 further comprising rotating the rear roof section during final retraction movement by camming the rear roof section.

21. The method of Claim 17 further comprising moving the entire supplemental actuator with a member coupled to the rear roof section for at least a majority of the retracted movement of the rear roof section, wherein the roof sections are hard-top roof sections.

22. The method of Claim 17 further comprising supplying pressurized fluid to the supplemental actuator to linearly extend a rod mounted to one of the roof sections.

23. An automotive vehicle comprising:  
a convertible roof including a retractable, front, hard-top roof section and a linkage assembly coupled to the front roof section;  
a first automatic actuator operably retracting the linkage assembly and the front roof section throughout a substantially full range of retracted movement; and  
at least a second automatic actuator operably moving a portion of the convertible roof only during a limited range of movement less than the full range in order to reduce a stowed dimension of the convertible roof.

24. The vehicle of Claim 23 wherein the convertible roof includes a retractable, rear, hard-top roof section.

25. The system of Claim 24 wherein the rear roof section is retracted to a substantially vertical position.

26. The system of Claim 25 wherein the front roof section is retracted to a substantially vertical position.

27. The system of Claim 24 wherein external surfaces of the front and rear roof sections are retracted to substantially parallel orientations facing substantially the same direction in an overlapping manner.

28. The vehicle of Claim 23 further comprising a rigid tonneau cover automatically movable to allow the convertible roof to retract into a roof storage compartment.

29. The vehicle of Claim 28 further comprising a pickup truck bed located behind the roof storage compartment.

30. The vehicle of Claim 23 further comprising a camming surface and a cam follower operably acting with the second actuator to control compacting movement of the convertible roof during retraction.

31. The vehicle of Claim 23 wherein the automatic actuators are fluid powered and have a linearly extendable piston rod.

32. An automotive vehicle comprising:  
a passenger compartment including a beltline;  
a convertible roof movable from a raised position covering the passenger compartment to a fully retracted position exposing the passenger compartment;  
a primary actuator operably moving the entire convertible roof;  
a supplemental actuator always located below the beltline, the supplemental actuator operably compressing the convertible roof at a positional range between a half-retracted position and the fully retracted position.

33. The vehicle of Claim 32 wherein the convertible roof includes a front, hard-top roof section and a linkage assembly, the linkage assembly being coupled to the front roof section and the primary actuator.

34. The vehicle of Claim 33 wherein the convertible roof includes a retractable, rear, hard-top roof section.

35. The system of Claim 33 wherein the front roof section is retracted to a substantially vertical position.

36. The vehicle of Claim 33 further comprising a rigid tonneau cover automatically movable to allow the convertible roof to retract into a roof storage compartment.

37. The vehicle of Claim 32 further comprising a camming surface and a cam follower operably acting with the supplemental actuator to control compacting movement of the convertible roof during retraction.

38. The vehicle of Claim 32 wherein the actuators are fluid powered and have a linearly extendable piston rod.

39. The vehicle of Claim 32 wherein the supplemental actuator compresses together front and a rear portions of the convertible roof in a fore-aft direction.